

Initial NuMI Beam

Start-up

S. Childress, 6 Dec..'04



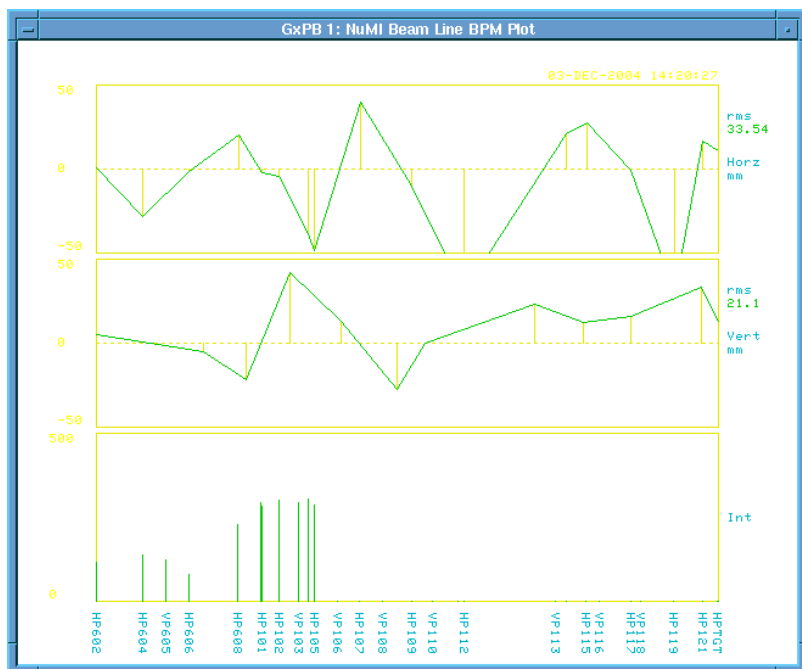
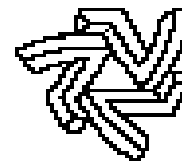
Dec. 3-4 Initial NuMI Primary Beam Start



- Low intensity – 3×10^{11} ; control each beam pulse extraction
- Target Out
 - Constraints: Don't radiate target hall (continuing effort with component handling tests); Transmit **PRIMARY** beam to hadron absorber.
- Major goal of test: Understand at early stage any fundamental issues with extraction and primary transport requiring Main Injector / Recycler tunnel access to address.
 - More than half of NuMI primary transport is in MI/RR interlock region



2nd Beam Pulse



BPM's

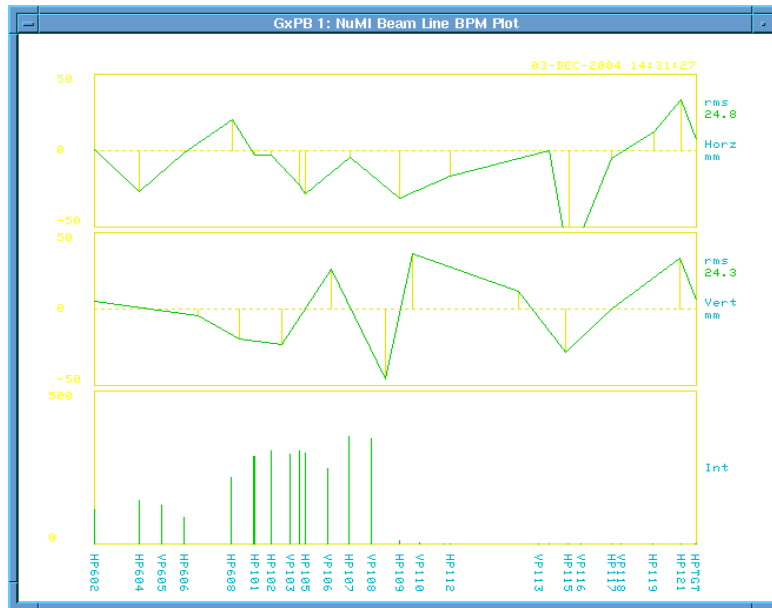
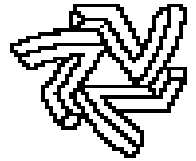


Profile Monitors

Good extraction from Main Injector. Beam is lost in HV101 rotated dipole string.



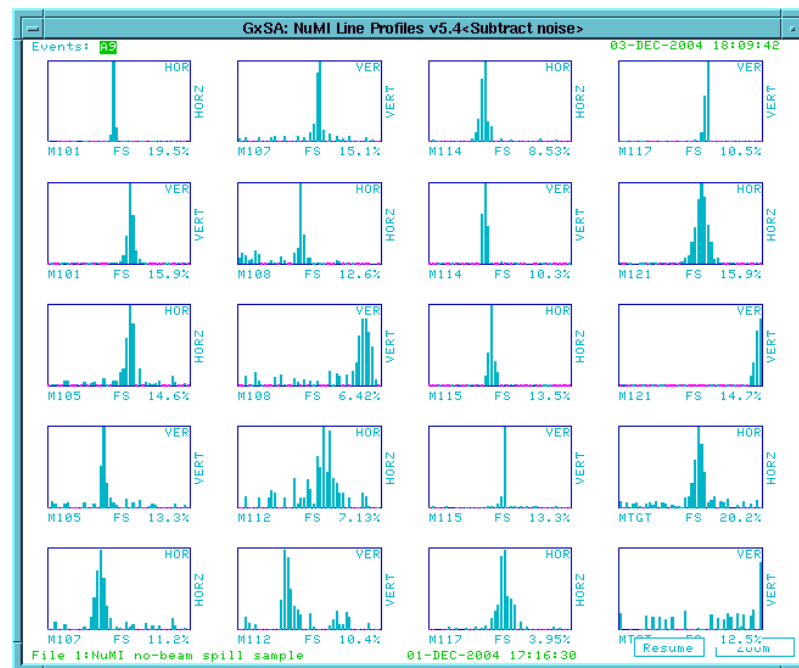
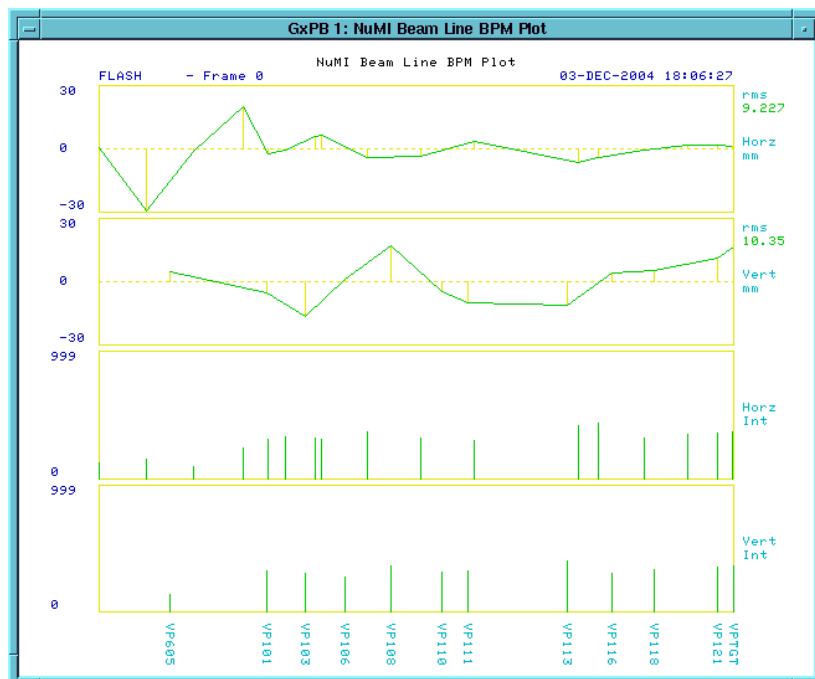
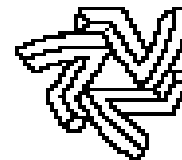
3rd Beam Pulse



Bram transported to V108 Downbend



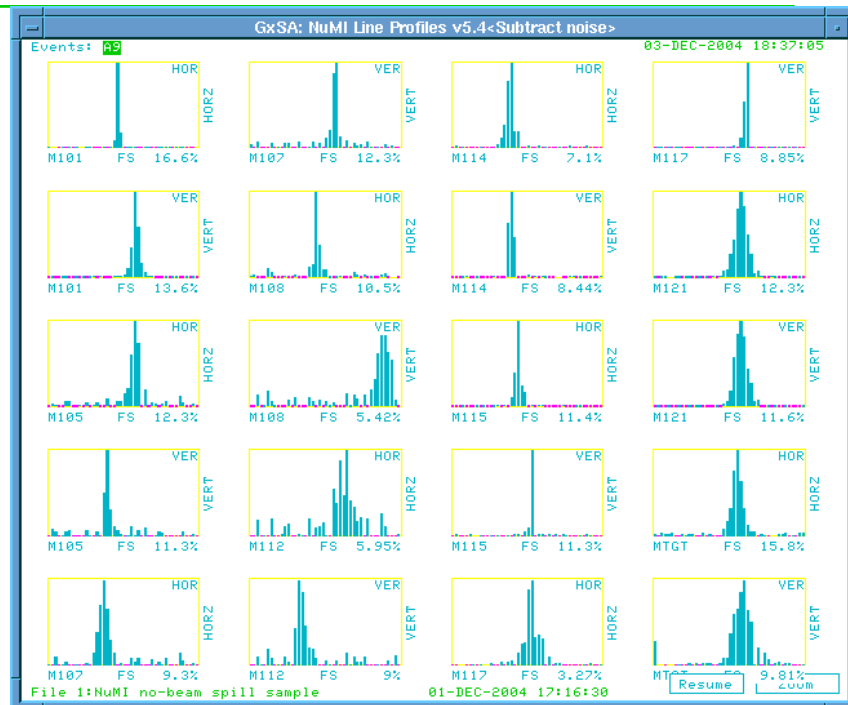
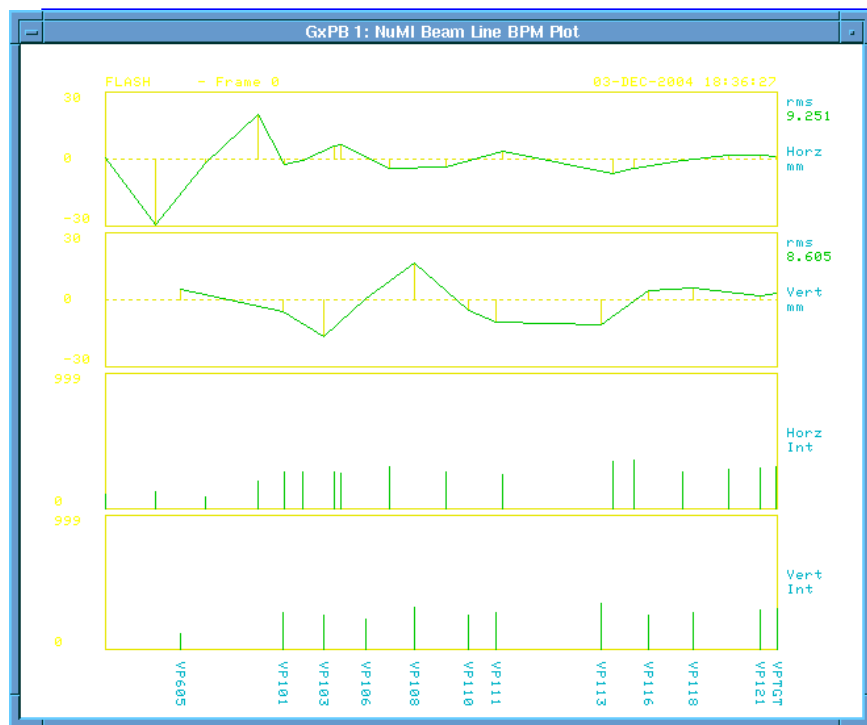
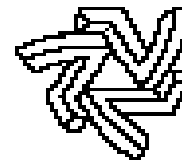
8th Beam Pulse



Beam transported thru all NuMI magnets.
Vertically high at targeting.



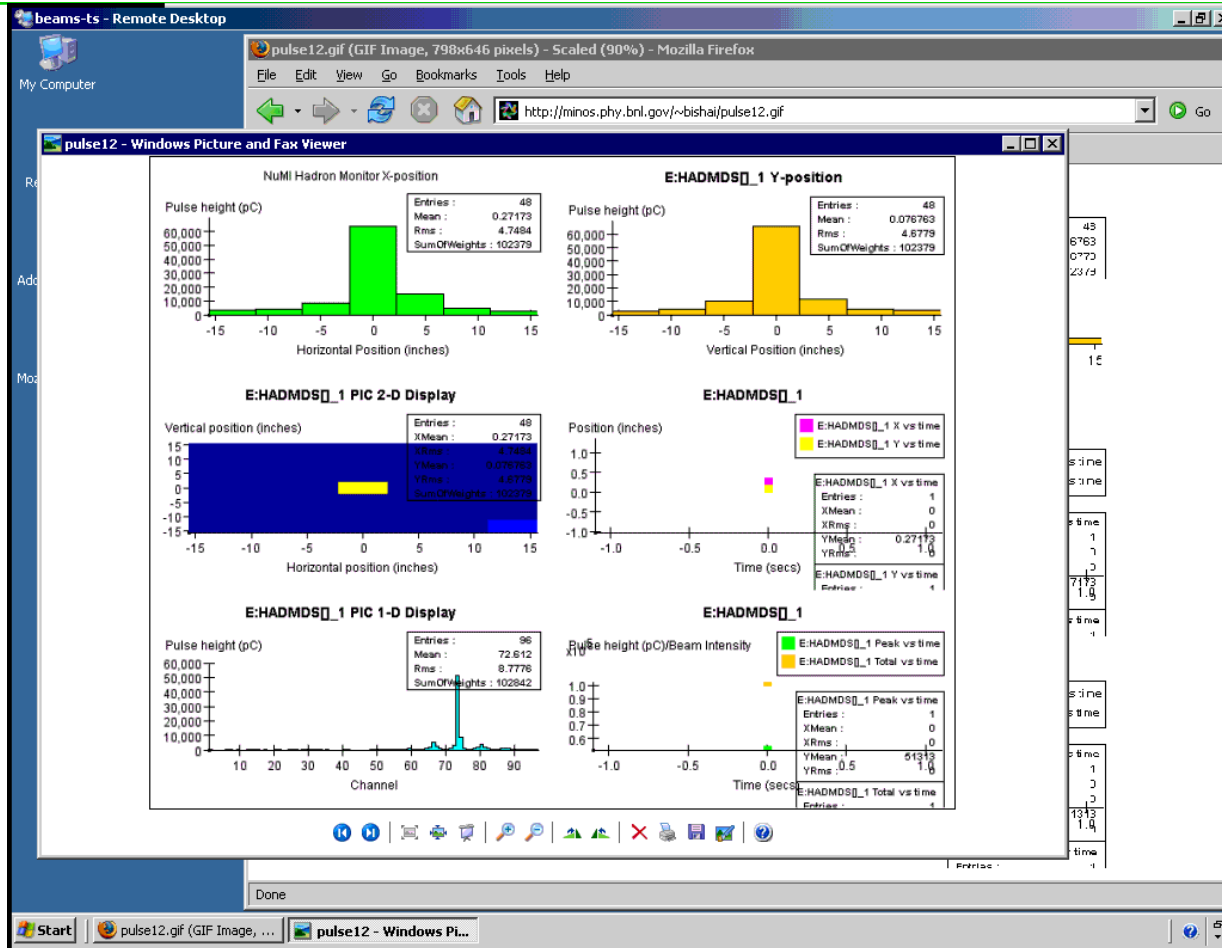
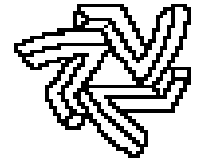
10th Beam Pulse



Beam ~ centered on target



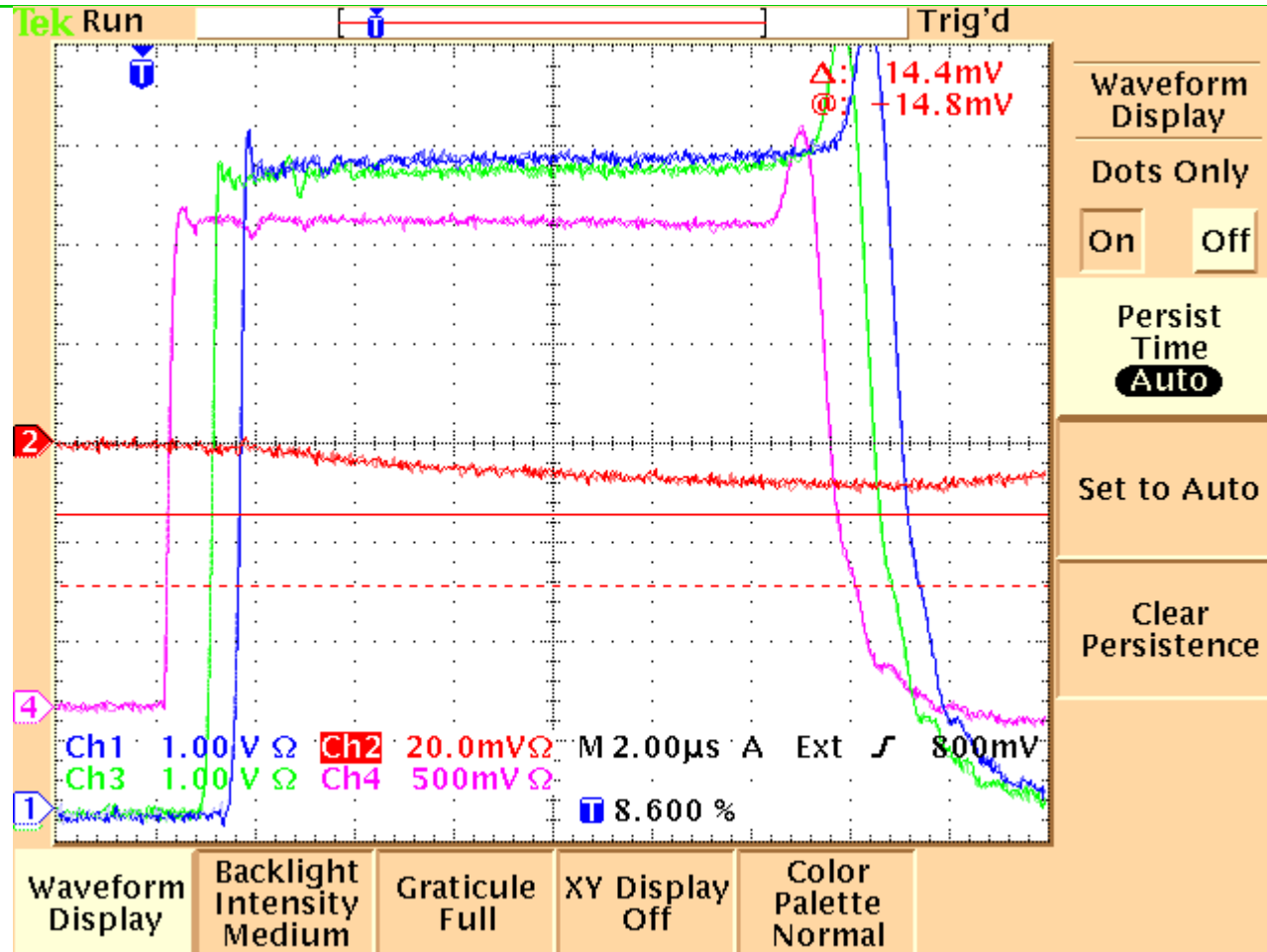
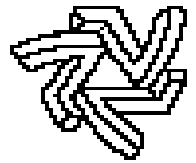
From 10th Beam Pulse



Primary beam centered at hadron absorber!



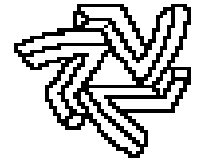
NuMI kickers – Uniformity over Pulse?



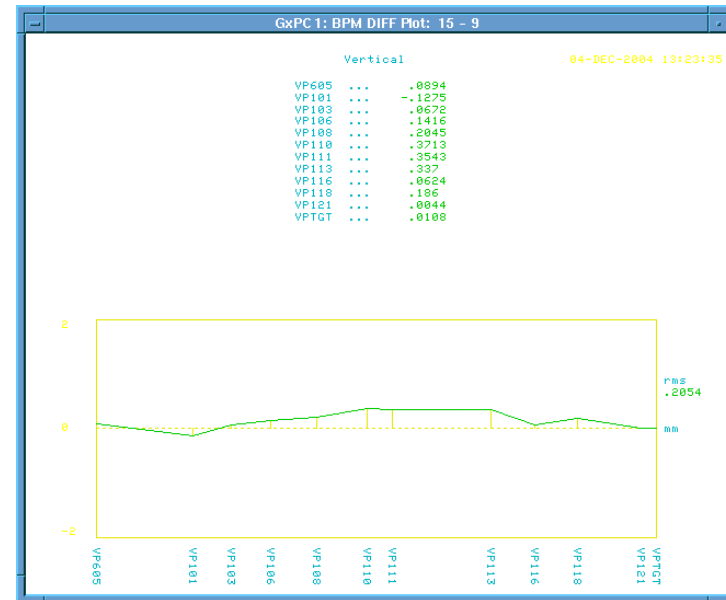
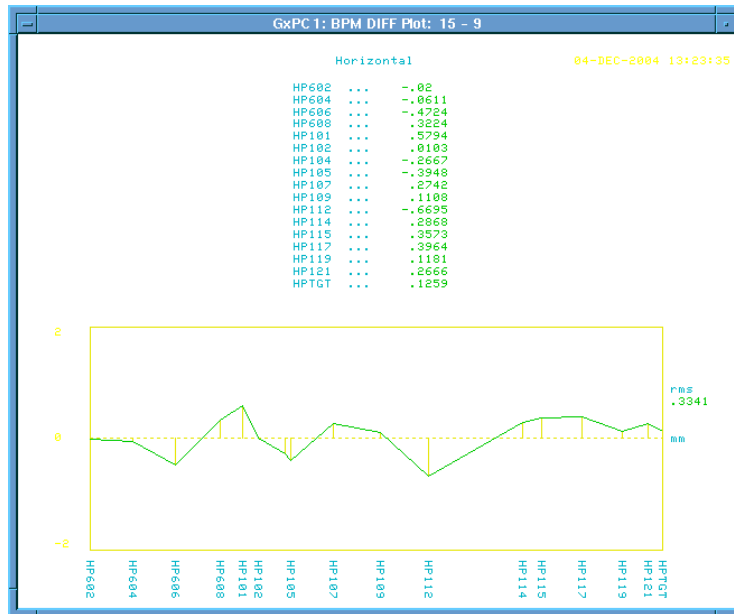
CH1: KM602A CH3: KM602B CH4: output of power supply
CH2: HP602



Beam Variation at Target over Kicker Pulse



Need < 0.25 mm beam stability ; 0.5% pulse uniformity



Sat Dec 4 13:50:08 comment by...AW -- BPM horizontal and vertical difference plots, +/- 2 mm scale, Pulse #12 (kicker advanced by 6 us) minus pulse #6 (kicker delayed by 1.5 us) Over a 7.5 us range measure 0.126mm deviation at target.



Summary: Initial NuMI Primary Beam Effort



- Should note that this is just a start
 - MINOS will need 4 orders of magnitude increment in beam power beyond first test conditions.
- **BUT – A very successful initial start!**
- **This weekend results are dependent on the sustained efforts by MANY people. The experts for each system worked to commission their components for this first beam – Almost everything has worked very well!!**



And then...

